Below is a non-exhaustive list of U.S. Patent and Trademark Office patents and applications for bruxism products and treatments, with sample excerpts from each that highlight the terms BRUX, BRUXING, BRUXISM, etc., as used to describe the patented/invented devices and/or processes, and also highlight some of the years for relevant publications that are cited WITHIN the patent text:

U.S. Patent No. 4,995,404 for APPARATUS FOR TREATING BRUXISM

Filed: <u>1988</u>; Issued: <u>1991</u>

"<u>Bruxism</u> is the nonfunctional gnashing, clenching or grinding of the teeth. <u>Bruxism</u> has been shown to cause or contribute to occlusal tooth wear, increased tooth mobility, tooth loss, bone loss, periodontal disease, muscle pain and spasm. headaches, backaches and temporomandibular joint (TMJ) dysfunction. It can occur nocturnally or diurnally but it is generally believed that this distinction represents two distinct phenomena. Nocturnal <u>bruxism</u> is by far the most serious and difficult to treat since the sufferer is asleep and unaware of grinding behavior.

In order to effectively treat nocturnal <u>bruxism</u>, it is important to understand how and when a <u>bruxing</u> behavior occurs during sleep. Nocturnal <u>bruxism</u> comprises regular repetitive side-to-side tooth contact, which differs markedly from more random patterns which occur during mastication or chewing and swallowing. <u>Bruxism</u> occurs during the lighter stages of sleep, primarily in stage 2 sleep. The termination of <u>bruxism</u> incidents is usually followed by a sleep stage lighter than that before the episodes occurred and never by a deeper sleep stage. Studies have led many researchers to hypothesize that <u>bruxism</u> is a disorder of arousal occurring during the transition from stages 3 and 4 of sleep, to stages 1 and 2.

A number of different treatments for **bruxism** have been proposed. These treatments include occlusal adjustment (see A. G. Glaros and S. M. Rao, "Bruxism: a Critical Review," Psychological Bulletin, vol. 84, pp. 767-781, 1977; and J. Ahlgren, K. A. Omnell, B. Sonesson and N. G. Toremalm, "Bruxism and Hypertrophy of the Masseter Muscle," Practica Oto-Rhino-Laryngologica, vol. 31, pp. 22-29, 1969); the use of occlusal appliances, such as night guards. and occlusal splints (see Glaros, et al., above) and J. E. Mejias, and N. R. Mehta, "Subjective and Objective Evaluation of *Bruxing* Patients Undergoing Short-Term Splint Therapy." Journal of Oral Rehabilitation, vol. 9, pp. 279-289, 1982, medication, such as local anesthesia or tranquilizers (see A. I. Chasins, "Methocarbamal (Robaxin) as an Adjunct in the Treatment of Bruxism," Journal of Dental Medicine, vol. 14, pp. 166-178, 1959; and M. A. Goldstein, "Clinical Investigation of Mephate in Dentistry," Dental Digest, vol. 62, p. 454, 1956); massed negative practice (e.g., clenching the teeth while awake to fatigue the jaw muscle) (see W. A. Ayer, "Massed Practice Exercises for the Elimination of Tooth-Grinding Habits," Behavior Research and Therapy, vol. 14, pp. 163-164; 1976; R. F. Heller and A. Forgione, "An Evaluation of Bruxism Control: Massed Negative Practice and Automated Relaxation Training," Journal of Dental Research, vol. 54, pp. 1120-1123, 1975); relaxation therapy (see B. A. Brown, Stress and the Art of Biofeedback, Harper and Row, New York, pp. 82-85, 1977; R. Hamilton, "Battling **Bruxism** through Biofeedback," TIC, pp. 8-11, May 1986; Heller and Forgione, above; and V. Cornellier, D. M. Keenan and K. Wisser, "The Effects of EMG Biofeedback Training upon Nocturnal and Diurnal **Bruxing** Responses," International Journal of Orofacial Myology, vol. 8, pp. 11-15, 1982); and aversive conditioning (see W. J. DeRissi, "A Conditioning Approach to the Treatment of *Bruxism*," PhD Thesis, University of Utah, 1970; R. F. Heller and H. R. Strang,

"Controlling **Bruxism** Through Biofeedback," Behavior Research and Therapy, vol. 11, pp. 327-329, 1973; R. A. Moss, D. Hammer, H. E. Adams, J. O. Jenkins, K. Thompson and J. Haber, "A More Efficient Biofeedback Procedure for the Treatment of Nocturnal **Bruxism**," Journal of Oral Rehabilitation, vol. 9, pp. 125-131, 1982; G. T. Clark, P. Beemsterboer and J. D. Rugh, "The Treatment of Nocturnal **Bruxism** using Contingent EMG Feedback with an Arousal Task," Behavior Research and Therapy, vol. 19, pp. 451-455, 1981; A. Piccione, T. J. Coates, J. M. George, D. Rosenthal and P. Karzmark, "Nocturnal Feedback for Nocturnal Bruxism," Biofeedback and Self Regulation, vol. 7, pp. 405-419, 1982; and M. Cherasia and L. Parks, "Suggestions for the Use of Behavioral Measures in Treating *Bruxism*." Psychological Reports, vol. 58, pp. 719-722, **1986**). Occlusal adjustment and the use of night guards represent dental approaches to treatment and are the outgrowths of mechanical etiology theories. The approach is to eliminate the trigger factors leading to bruxism and to prevent further damage to teeth and soft tissues. Relaxation therapy and medication address the stress that can lead to *bruxism*, whereas massed negative practice and aversive conditioning are techniques for "unlearning" bruxism behavior. Although varying degrees of success have been reported with all six treatment procedures, aversive conditioning appears to have the most promise."

. . .

The alarm can use multiple stimuli, for example, to cause a maximum arousal and require the **bruxist** to arise and cross the room to turn the unit off. Requiring the patient to wake up and turn off the alarm would be the type of arousal contingency thought by some to be necessary for the successful treatment of **bruxism**. The alarm unit could also incorporate a keypad requiring the **bruxist** to be awake enough to punch in a certain sequence of keys in order to discontinue the alert or turn the unit off. The apparatus can incorporate a counter to keep track of the number of **bruxing** events occurring during a night so that improvement could be gaged over time. The apparatus could be programmed to ignore preset percentages of **bruxing** events, thus implementing an intermittent consequences schedule, which again is thought to be conducive to the treatment of **bruxism**."

NOTE: Except for the two that are listed in the <u>BRUXISM</u> book of Ex. A, the articles mentioned above are also listed in the table below, for more convenient review:

Year	Record No.	Description of Cited Publication, per above U.S. Patent
1956	1	M. A. Goldstein, "Clinical Investigation of Mephate in Dentistry," Dental Digest, vol. 62, p. 454, <u>1956</u>)
1959	2	A. I. Chasins, "Methocarbamal (Robaxin) as an Adjunct in the Treatment of <i>Bruxism</i> ," Journal of Dental Medicine, vol. 14, pp. 166-178, <u>1959</u> ;
1969	3	J. Ahlgren, K. A. Omnell, B. Sonesson and N. G. Toremalm, " <i>Bruxism</i> and Hypertrophy of the Masseter Muscle," Practica Oto-Rhino-Laryngologica, vol. 31, pp. 22-29, <u>1969</u>

1970	4	W. J. DeRissi, "A Conditioning Approach to the Treatment of <i>Bruxism</i> ," PhD Thesis, University of Utah, 1970
1973	5	R. F. Heller and H. R. Strang, "Controlling <i>Bruxism</i> Through Biofeedback," Behavior Research and Therapy, vol. 11, pp. 327-329, <u>1973</u>
1975	6	R. F. Heller and A. Forgione, "An Evaluation of <i>Bruxism</i> Control: Massed Negative Practice and Automated Relaxation Training," Journal of Dental Research, vol. 54, pp. 1120-1123, <u>1975</u>)
1976	7	W. A. Ayer, "Massed Practice Exercises for the Elimination of Tooth-Grinding Habits," Behavior Research and Therapy, vol. 14, pp. 163-164; <u>1976</u>
1977	8	G. Glaros and S. M. Rao, " <i>Bruxism</i> : a Critical Review," Psychological Bulletin, vol. 84, pp. 767-781, <u>1977</u>
1977	9	B. A. Brown, Stress and the Art of Biofeedback, Harper and Row, New York, pp. 82-85, <u>1977</u>
1981	10	G. T. Clark, P. Beemsterboer and J. D. Rugh, "The Treatment of Nocturnal <i>Bruxism</i> using Contingent EMG Feedback with an Arousal Task," Behavior Research and Therapy, vol. 19, pp. 451-455, 1981
1982	11	J. E. Mejias, and N. R. Mehta, "Subjective and Objective Evaluation of <i>Bruxing</i> Patients Undergoing Short-Term Splint Therapy." Journal of Oral Rehabilitation, vol. 9, pp. 279-289, 1982
1982	12	V. Cornellier, D. M. Keenan and K. Wisser, "The Effects of EMG Biofeedback Training upon Nocturnal and Diurnal <i>Bruxing</i> Responses," International Journal of Orofacial Myology, vol. 8, pp. 11-15, <u>1982</u>)
1982	13	R. A. Moss, D. Hammer, H. E. Adams, J. O. Jenkins, K. Thompson and J. Haber, "A More Efficient Biofeedback Procedure for the Treatment of Nocturnal <i>Bruxism</i> ," Journal of Oral Rehabilitation, vol. 9, pp. 125-131, <u>1982</u>
1982	14	A. Piccione, T. J. Coates, J. M. George, D. Rosenthal and P. Karzmark, "Nocturnal Feedback for Nocturnal <i>Bruxism</i> ," Biofeedback and Self Regulation, vol. 7, pp. 405-419, 1982
1986	15	R. Hamilton, "Battling <u>Bruxism</u> through Biofeedback," TIC, pp. 8-11, May <u>1986</u>

16	M. Cherasia and L. Parks, "Suggestions for the Use of
	Behavioral Measures in Treating Bruxism ."
	Psychological Reports, vol. 58, pp. 719-722, <u>1986</u>).

U.S. Patent No. 4,519,386 for MOUTH SPLINT

Filed: <u>1983</u>; Issued: <u>1985</u>

"...Therefore, since the muscles of mastication do not routinely release this potential energy, a person will often develop other methods of release. For example, patients consciously grind their teeth in an intense situation, employing the excess energy in a deleterious direction. Similarly, at night, many patients unconsciously viciously *brux* their teeth to exhaust this stored energy..."

U.S. Patent No. 5,338,190 for DENTAL APPLIANCE

Filed: <u>1993</u>; Issued: <u>1994</u>

- "...The dental appliance can be a splint, such as for <u>bruxism</u>, temporomandibular disorders, or mandibular repositioning appliances..."
- "... The dental appliance can be utilized as a night guard, <u>bruxism</u> splint, T.M.D. appliance, or functional orthodontic appliances and can be made for either dental arch, upper or lower..."
- "...The appliance does not wear as fast as a resilient splint (i.e. <u>Brux-</u>eze); and therefore, is ideal for heavy <u>bruxer</u> or clencher..."
- "...The appliance lasts longer for heavy *bruxers* and/or clenchers..."

U.S. Patent No. 5,553,626 for DEVICE FOR PREVENTING BRUXISM

Filed: <u>1995</u>; Issued: <u>1996</u>

- "...An anti <u>bruxism</u> device for stopping or at least diminishing <u>bruxism</u> comprises a splint adapted to be secured to a tooth of a user, and a biofeedback system mounted on the splint. The biofeedback system includes a detector for detecting <u>bruxism</u>, and a stimulation device for stimulating the user responsive to detection of <u>bruxism</u> by the detector. The stimulation produced by the stimulation device causes the user to stop <u>bruxating</u>. <u>Bruxism</u> is a function that could damage teeth and molars, and may affect the neuro-muscular system in a negative way, and could cause, for example, headaches..."
- "...The invention concerns an anti-<u>bruxism</u> device. <u>Bruxism</u> is a conscious or subconscious parafunction that takes place during the day and/or at night, and consists of a static and/or dynamic contact between the chewing levels of the mandibular and upper jaw..."

U.S. Patent No. 5,911,576 for MEASURING DEVICE FOR QUANTIFYING THE SEVERITY OF

BRUXISM

Filed: <u>1998</u>; Issued: <u>1999</u>

- "...A <u>bruxism</u> monitoring device comprising a thin shell formed to the shape of and elastically retained to one or more teeth, said shell further comprising: a plurality of layers having mutually distinguishable colors, each color distinguishable from the colors of adjacent layers; and a material thickness that is greater anteriorly than posteriorly. The outer layer of the shell, when worn away by grinding action, reveals an inner layer. The regions of wear may be analyzed to determine the extent of the <u>bruxing</u> activity..."
- "...This invention relates to <u>bruxism</u> measurement devices and more particularly to an intraoral appliance for quantifying the extent of wear due to the grinding action of teeth..."
- "...<u>Bruxism</u> has generally been defined as the nonfunctional clenching, grinding, gritting, gnashing, and clicking of the teeth. <u>Bruxism</u> can occur while a person is awake or asleep. When the phenomenon occurs during sleep, it is called nocturnal <u>bruxism</u>. Even when it occurs during waking hours, the <u>bruxist</u> is often not conscious of the activity. Biting force exerted during <u>bruxism</u> often significantly exceeds peak biting force exerted during normal chewing. Biting forces exceeding 700 pounds have been measured during <u>bruxing</u> events. Chronic <u>bruxism</u> may result in musculoskeletal pain, headaches, and damage to the teeth and/or the temporomandibular joint..."
- "...The symptoms of <u>bruxism</u> include: clicking or grinding noises detected by a sleeping partner, wear facets on a <u>bruxist's</u> tooth surfaces, jaw pain, headaches, damage to teeth or dental work, and over development of the jaw muscles. When <u>bruxism</u> is severe, it may be accurately diagnosed by the presence of jaw pain and over development of the jaw muscles. When <u>bruxism</u> is less severe, it may be difficult to diagnose. For example, wear facets are often detected by a dentist during a dental examination, but may have resulted from <u>bruxing</u> during a previous period of the patient's life. Because nocturnal <u>bruxism</u> is a subconscious activity, <u>bruxists</u> may not be aware of their <u>bruxing</u> and may not believe that they <u>brux</u> even when presented with strong circumstantial..."
- "...The primary treatment for nocturnal <u>bruxism</u> is the use of intraoral occlusal splints or "mouth guards," which are generally semi-rigid plastic covers for the upper or lower teeth. Occlusal splints are generally fabricated for a specific individual from an impression taken of the individual's teeth. While the splints protect the teeth from wear due to <u>bruxism</u>, research indicates that they may exacerbate or reduce the <u>bruxism</u> itself depending on the particularities of the situation..."
- "...It is the object of this invention to provide an incontrovertible, inexpensive, and convenient means for measuring the severity of *bruxism*..."

U.S. Patent No. 7,874,294 for DEVICE FOR PREVENTING BRUXISM

Filed: **2004**; Issued: **2011**

"...As well as for such an accurate fixing of the device in the mouth, anchoring members 2 also serve as signal sensor for detecting said muscle activity and as electrode for generating the correcting electrical stimulus. In order to measure the muscle activity, members 2 operate as a receiving antenna for receiving an electro-muscular signal from the chewing muscles. The exact position of electrodes 2 herefor is found in practice not to be very critical. By administering an electrical pulse as stimulus at the correct position via the same electrodes 2, the detected parafunctional muscle activity is interrupted and a relax reflex is induced, whereby the chewing muscles return to a state of rest. This is the same reflex which occurs when one bites unintentionally on something hard, for instance a hard piece in a currant bun. Anchoring

members 2 thus have a three-fold function. Through wearing the device and receiving an electrical pulse each time there are signs of <u>bruxism</u>, the user becomes conditioned, whereby the <u>bruxism</u> behaviour will eventually stop completely. By using the device to a sufficient extent and for a long period, <u>bruxism</u> can thus be overcome and the neuromuscular equilibrium of the head/neck area restored. The chewing force then has its normal physiological value again and the patient is rid of the above described adverse effects of <u>bruxism</u>. Because the vicious circle of <u>bruxism</u> also described above is broken and physiologically the body is functioning normally again, existing, already contracted disorders also have the opportunity to disappear..."

<u>U.S. Patent No. 8,074,659 for METHOD AND APPARATUS FOR PROTECTING TEETH,</u>

<u>PREVENTING THE EFFECTS OF *BRUXISM* AND PROTECTING ORAL STRUCTURES FROM SPORTS INJURIES</u>

Filed: **2009**; Issued: **2011**

- "...Note for the present purposes, <u>bruxism</u> is a habit of clenching and grinding of the teeth. It most often occurs at night during sleep, but may also occur during the day. It is an unconscious behavior or habit perhaps performed to release anxiety, aggression or anger. <u>Bruxism</u> occurs when people clench or tightly hold their top and bottom teeth together or grind their teeth, meaning sliding the teeth back and forth over each other. This wears away the teeth surfaces, with teeth surface abrasion the most clinically important sign of <u>bruxism</u>. Note, as far as pediatric <u>bruxism</u> is concerned, there is a standard type of <u>bruxism</u> or a so-called eccentric <u>bruxism</u>, both of which are preventable with the proper type of fitted mouth protector..."
- "...In one embodiment, the multi-layer reinforced structure provides exceptional protection against not only *bruxism* but also tough sports injuries in that it dissipates the forces applied on the face, jaws and soft tissues to prevent tooth, gum and jaw damage such as jaw bone fracture..."

U.S. Patent No. 8,082,923 for INTRA-ORAL DEVICE

Filed: **2009**; Issued: **2011**

"...The present invention relates generally to intra-oral devices and, in particular, a mass produced, semi-custom, intra-oral separator device, intended to be worn by the user for the elimination or relief of grinding, clenching, *bruxing*, and related parafunctional habits, as well as head, neck and jaw related pain. Grinding, clenching and *bruxing* and related parafunctional habits can produce structural damage to, and disease of, the teeth, gums and supporting structures including the temporomandibular joint..."

U.S. Patent No. 8,105,210 for JAW RELAXATION EXERCISE APPLIANCE

Filed: **2008**; Issued: **2012**

"...In TMD the muscles used for chewing and the joints of the jaw fail to work in conjunction. Due to emotional stress, some people clench their teeth so hard that they jolt their jaw out of its natural position, resulting in TMD. The misalignment of the TMJ causes muscle spasms, resulting in pain in front of the ear and in the head. The pain may also spread to the neck,

shoulders and back. A number of problems may occur as a result of a temporomandibular joint disorder including headaches, jaw clenching, and <u>bruxism</u> (i.e., side-to-side grinding of teeth). A number of other problems may occur as a result of a strained disc, including TMJ lock, shoulder, neck, and back pain, and headaches..."